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Beltsville Agricultural Research Center

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U.S. Department of Agriculture • Agricultural Research Service
Program Aid Number 1626 • May 1998





Livestock & Poultry



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products to feed and developing alternative therapies

and management control programs for coccidiosis, a disease that costs the U.S. poultry industry \$300 million annually. The disease is controlled by adding anticoccidial drugs to poultry feed. Several natural products when fed to birds inhibit this protozoan parasite—fats that contain high levels of fish

or flaxseed oils, a natural anti-malarial product (artemisinin), and a sugar beet product (betaine).

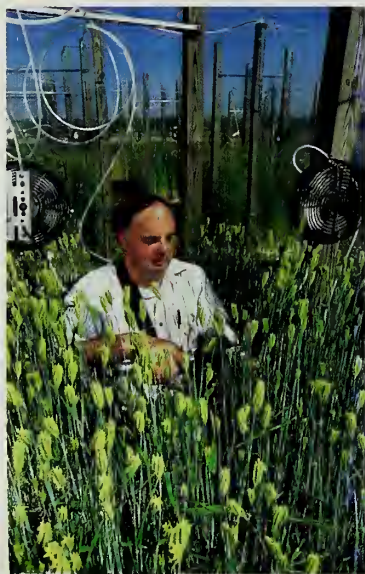


► **Ready-to-eat, fresh-cut fruits and vegetables** are the fastest growing segment of the

produce industry. Scientists in the Beltsville Horticultural Crops Quality Laboratory are working on ways to keep

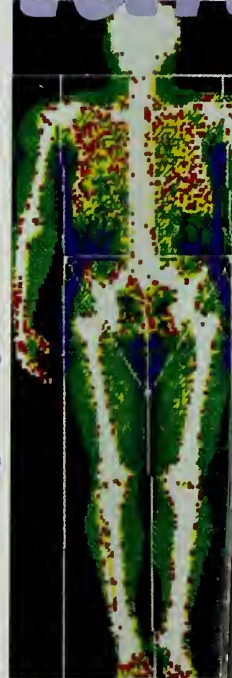
these products fresh, tasty, and safe to eat over longer storage periods.

◀ **Drought, heat, air pollution, and climate** can affect plant growth and yield. Here, a scientist measures how increased levels of carbon dioxide in the air affect the amount of water that a plant uses. Results from environmental stress studies such as this one can eventually lead to new plant varieties better suited to our changing ecology.



Human

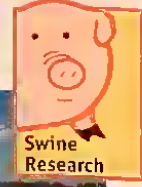
Nutrition



Livestock & Poultry



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◀ **A major challenge for the U.S. dairy industry** is the need to minimize the effect of excreted nutrients on the environment. Beltsville scientists are studying ways to recycle nutrients in manure in urban dairies. Using heat and microbes, an anaerobic digester system turns manure first into acids and then into the gases methane and carbon dioxide. The solid, odor-free product of digestion is used at Beltsville as a compost additive, landscape medium, or fertilizer.

► **Coliform bacteria cause half the mastitis** (udder infections) in the nation's 10 million dairy cows. Beltsville scientists have developed monoclonal antibodies that improve the animals' ability to kill the bacteria. Proteins



found in cow's blood are also being used to neutralize coliform toxins and the products of inflammation responsible for udder damage. The antibodies and the blood proteins are being tested as alternative treatments for mastitis.



► **Beltsville scientists have combined ancient farming practices with state-of-the-art technology** as they study a system that grows more and better vegetables while reducing erosion and loss of soil nutrients. Called sustainable production, the system is based on the use of cover crops as mulch instead of conventional black plastic. The cover crops permit reductions in expensive fertilizers, pesticides, and tillage operations and increase organic matter.

Plant Sciences



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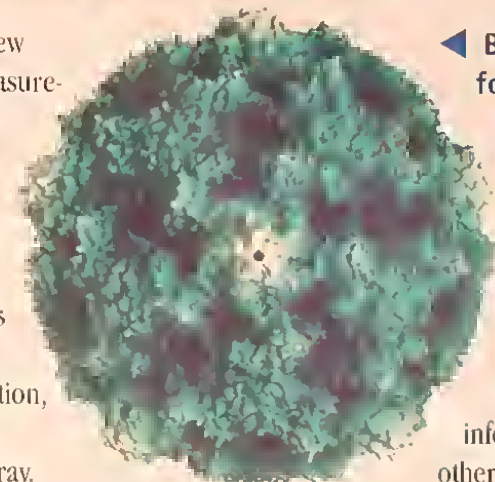


Human Nutrition

◀ **DEXA (dual energy x-ray absorptiometry)** is a new method to measure bone density and body composition—measurements important for better understanding the role of diet and lifestyle in body composition and consequently the risks for



diseases such as osteoporosis and obesity. Fast and very accurate, DEXA passes through the body two minute doses of radiation, equivalent to a small fraction of a dental x-ray. Since lean tissue, bone, and fat absorb the energy differently, researchers can calculate body composition from the amount of energy moving through the body.

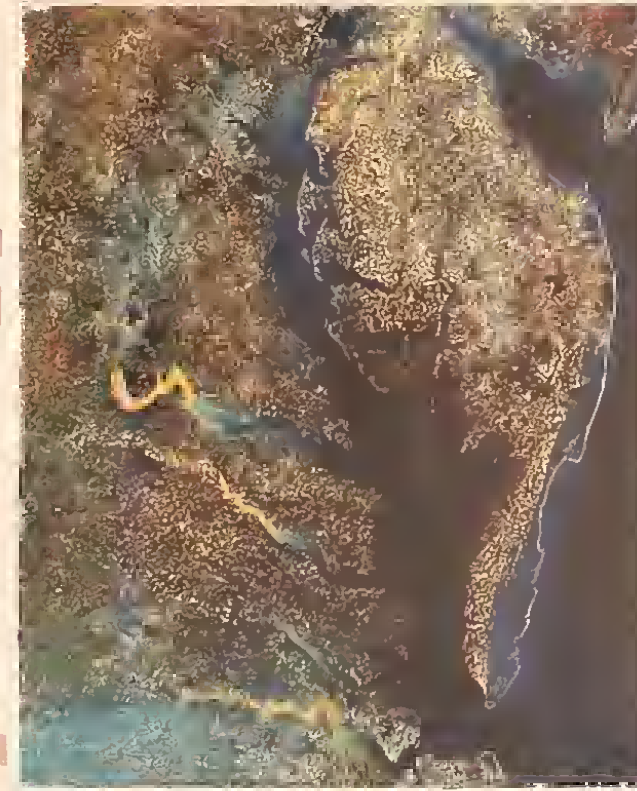


◀ **BARC scientists have found that a normally harmless Coxsackie B3 virus can destroy heart muscle** in mice given diets deficient in the essential trace mineral selenium or in vitamin E. Scientists believe this is the first time a host's diet has been shown to affect the virulence, or strength, of a viral infection. If these results can be applied to other viruses, they could have a bearing on scientists' understanding of other diseases of humans and animals, such as polio, hepatitis, and even the common cold.

Image by Sgro and J. Muckelbauer et al. PDB 1COV, University of Wisconsin, Madison.



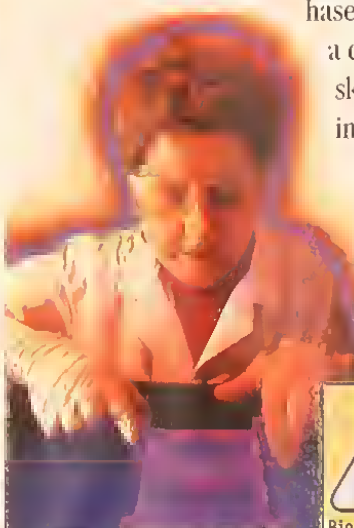
Natural Resources



◀ **Beltsville Area scientists are involved in ongoing efforts to revive the Chesapeake Bay**, seen here from 438 miles in space from Landsat-5. Working closely with employees from other federal and state agencies, BARC scientists have intensified their commitment to stop the excessive release of nutrients into the Bay from all sources, as well as the discharge of pesticides, metals, and other pollutants. In pioneering work, Beltsville Area scientists demonstrated that significant amounts of pesticides could leave plants and soil as vapors, become airborne, and return to land or water in wet forms such as rain, snow, sleet, hail, or fog. These substances can also be deposited dry, either as gases that dissolve in the Bay or attached to dust or other dry particles.



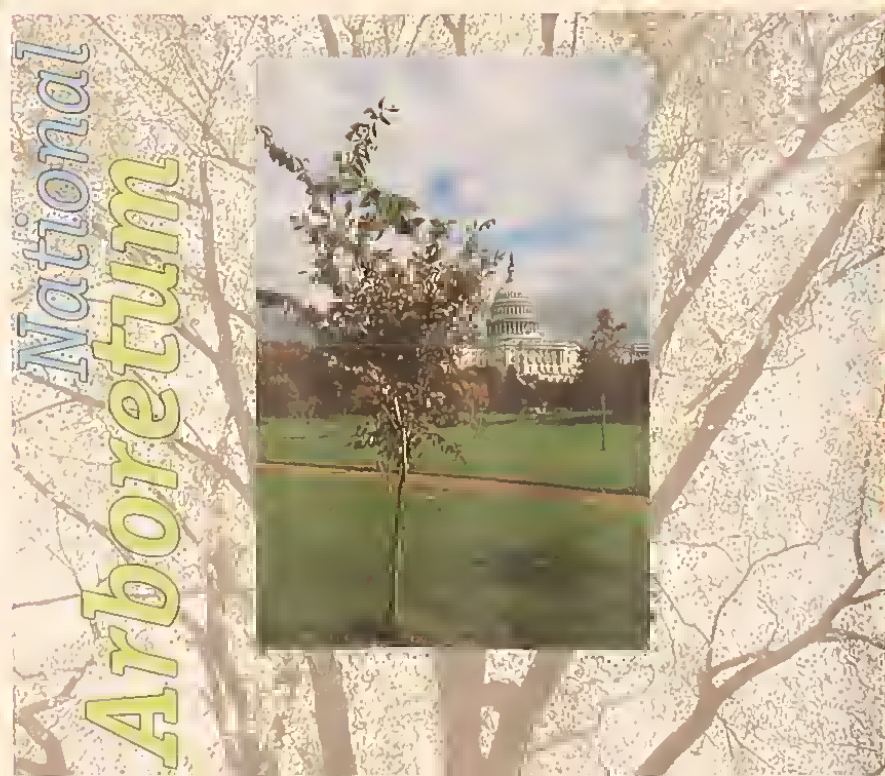
► **Since 1926, Federal inspectors have used sight, touch, and smell to inspect the poultry we eat.** Now, BARC scientists are developing an automated poultry inspection system. The system is based on the principle that a wholesome bird has a different chemical composition and perhaps skin color than an unwholesome one. A near-infrared light is shone on the bird, and a multispectral camera, which can detect a wide range of light wavelengths, compares pictures of the bird through different-colored filters to see if it is wholesome.



Resources



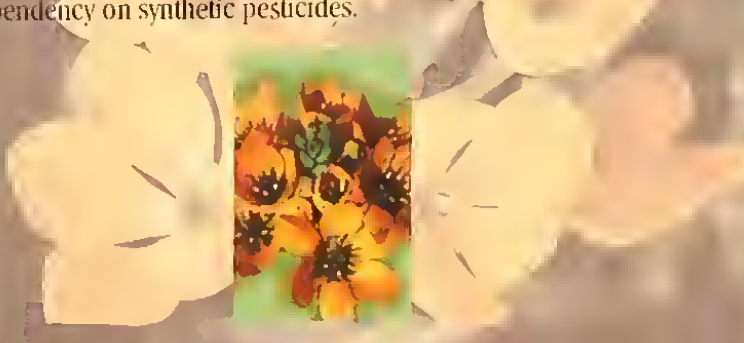
► **Thanks to the efforts of the National Arboretum**, a part of the Beltsville Area, the Nation's cities may once again be lined with elm trees, only these will be resistant to the devastating Dutch elm disease. After more than 20 years of work, Arboretum scientists released two new American elm varieties—Valley Forge and New Harmony—products of the Arboretum's tree genetics program. The trees were bred for their resistance to the fungus, which has killed millions of the prized trees since its invasion in this country in the 1930s.



National Arboretum



◀ **For more than 20 years, the versatile neem tree has been a focus of BARC research.** Scientists pioneered the use of neem seed as an alternative for synthetic pesticides. They found that the seed oil can kill pests such as whiteflies, aphids, mealybugs, and mites. They also showed that the oil can protect several ornamental and food crops against fungal diseases such as rust and powdery mildew. BARC scientists began their research in 1975, when products extracted from neem seeds were evaluated for their natural insect-killing properties. The focus is to develop natural products from the plant that can reduce our dependency on synthetic pesticides.



Fruit Research

Vegetable
Research

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Research

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Resources
Research

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Capital

Exit 24
(Eastbound
Only)

M
Metro
Parking

Beltway

Exit 23

U.S. Route 1

Rhode Island Avenue

Cherry Hill Road

To University of
Maryland,
College Park

Kenilworth Avenue

Exit

North



To U.S. National Arboretum

3501 New York Ave., N.E.
Washington, D.C. 20002
Phone: 202-245-2726

Directions from BARC: Baltimore-Washing
Parkway south to New York Avenue. Left
onto Bladensburg Road. Left onto R Stre
follow to the end to Arboretum gates.

Beltsville Agricultural Research Center

Visitors may take a guided tour of the Center during regular working hours: Monday through Friday, 8:00 a.m. to 4:30 p.m.

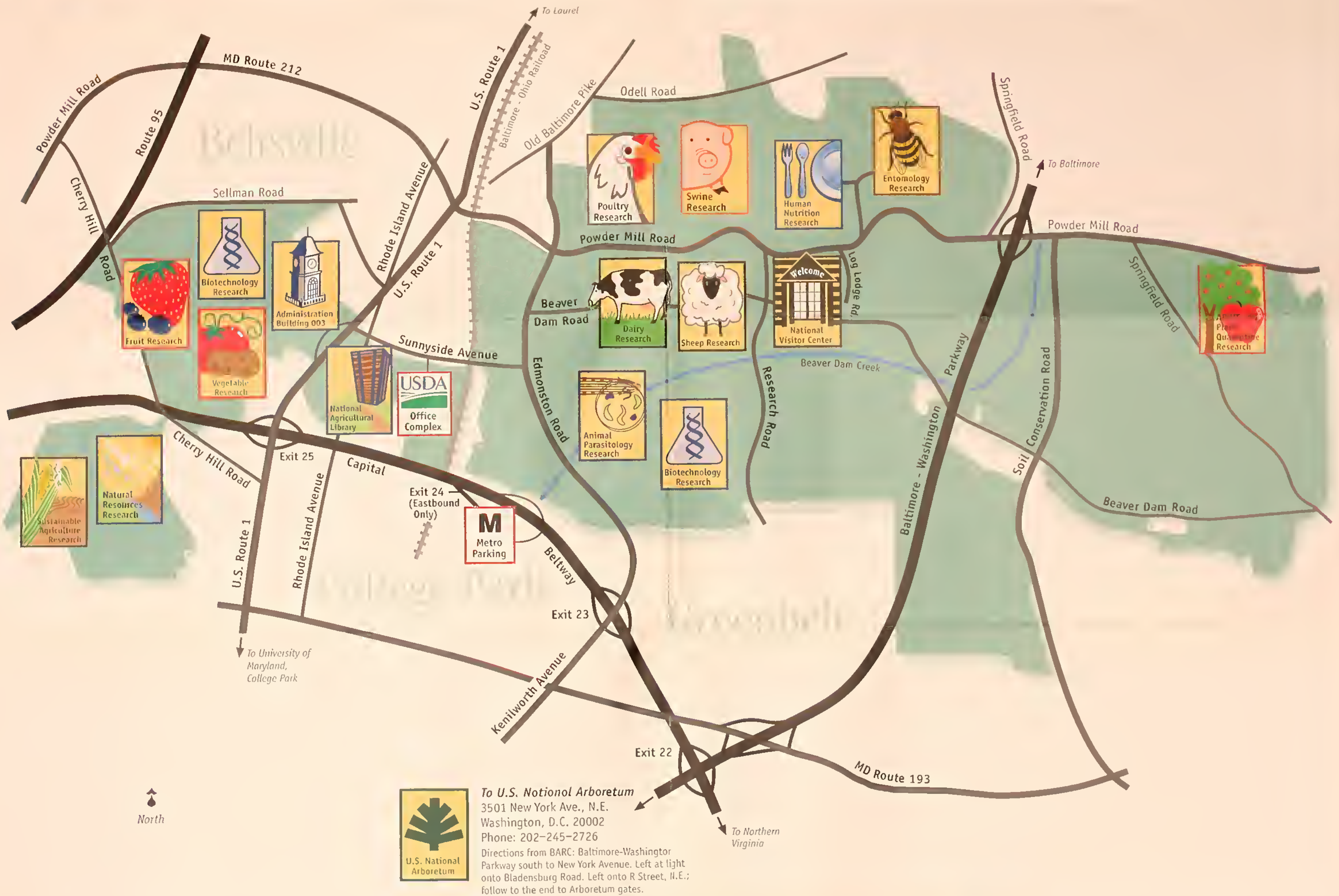


Tours are by appointment only through the National Visitor Center. To arrange for your visit, call or write:

301-504-9403

ARS National Visitor Center, 10300 Baltimore Avenue, Building 302, Beltsville, MD 20705-2350

Visit the BARC web site at: <http://www.barc.usda.gov/>



The Beltsville Agricultural Research Center (BARC)

is located on 7,000 acres of land in Beltsville, Maryland, just outside of downtown Washington, D.C. Both a working farm and an experimental one, the Beltsville Area is made up of 47 laboratories and

management units, plus the 441-acre U.S. National Arboretum located in northeast Washington, D.C.

The Beltsville Area is part of the Agricultural Research Service, the main research agency of the U.S. Department of Agriculture. ARS is one of four agencies that make up the U.S. Department of Agriculture's Research, Education, and Economics mission area. The ARS mission is to conduct research to develop and transfer solutions to agricultural problems of high national priority and to provide information access and dissemination to—

- ensure high-quality, safe food and other agricultural products
- assess the nutritional needs of Americans
- sustain a competitive agricultural economy
- enhance the natural resource base and the environment, and
- provide economic opportunities for rural citizens, communities, and society as a whole.

The great breadth and scope of this mandate are expressed in Beltsville's research programs, which range from conservation of our soil, water, and air resources to human nutrition. Beltsville scientists do basic and applied research in plant and animal genetics, physiology, and chemistry, as well as a wide range of research in other areas, including new instrumentation, germplasm databases, and computer modeling of complete production systems.



In recent years, the Beltsville Area research program has expanded beyond traditional plant and animal breeding, nutrition, and chemical control of pests to encompass biotechnology, genome mapping, and biological control of diseases, insects, nematodes, and weeds. Major programs deal with environmental protection, food safety and health, and sustainable agriculture. Ever-increasing sophistication of instrumentation aids scientists who work in state-of-the-art greenhouses and laboratories, controlled-environment chambers, and animal facilities, as well as in the field.

Since 1910, when Beltsville's scientists began their work to ensure that the nation has enough healthful food, Beltsville's record of accomplishments and ongoing programs has made it a world leader in agricultural research. Its international reputation attracts thousands of visitors each year from the United States and abroad. The Beltsville Agricultural Research Center is among the largest and most diversified agricultural research complexes in the world.

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*This brochure was produced by the ARS Information Staff:
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